

# concrete construction

**JULY 1958**

**VOL. 3, NO. 7**

**EDITED FOR**

All who are concerned with quality, **JOB PLACED CONCRETE** (including prestress, tilt-up, lift slab, and thin-shell)—its production, handling, forming, reinforcing, placing, finishing, and curing; **CONCRETE CONTRACTORS; GENERAL CONTRACTORS; INDUSTRIAL CONSTRUCTION AND MAINTENANCE MEN; ENGINEERS; ARCHITECTS; STATE HIGHWAY ENGINEERS; READY-MIXED CONCRETE PRODUCERS.**

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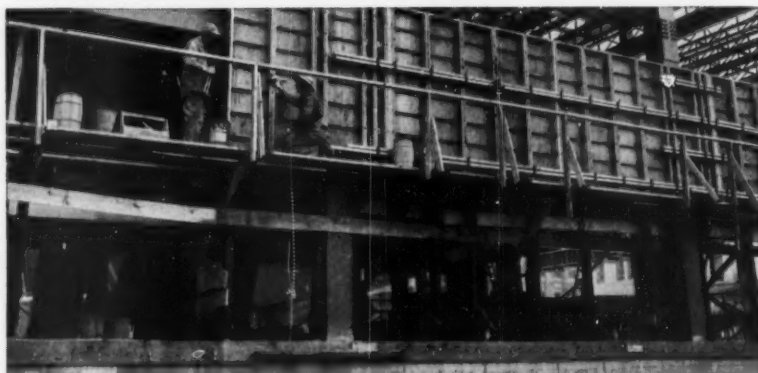
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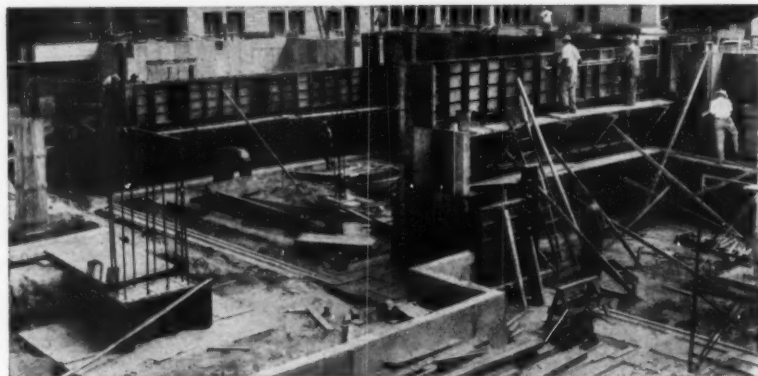
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CLARISSA McKNIGHT, product news editor  
JOHN DEMLING, contributing editor

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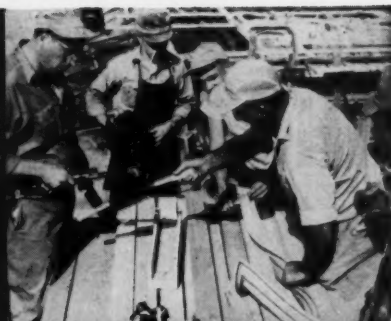
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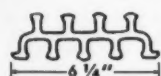
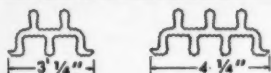
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Indented pour. Normal agitation fills corrugated ribs.

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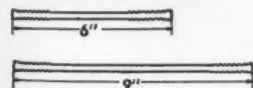
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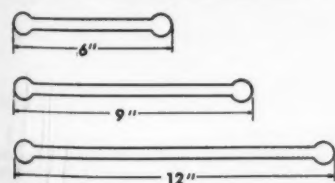
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**Here's a technique that makes it possible  
to restore many concrete pavements to first-class condition  
without having recourse to materials other than concrete.**

## Thin Bonded Resurfacing

SO MUCH IS MADE NOWADAYS of the fact that concrete requires little maintenance that pavements are sometimes grossly neglected. Then, too, most of the concrete roads in use today do not have the advantages devised by modern research: such advantages, for example, as air-entrainment, sawed joints, and the employment of vastly improved paving machines and materials.

As a result, a considerable amount of pavement in this country becomes in need of resurfacing every year. There has been a regrettable tendency among some engineers to lay a flexible topping and write the road off as a really first-class thoroughfare. This is unfortunate, since in many cases these roadways are still structurally sound and could deliver many more years of safe, smooth driving if they were properly topped or patched.

The problem boils down to the need for a simple means of providing a new wearing-riding surface for damaged or worn areas using as little material and manpower as possible. One answer is thin bonded concrete resurfacing.

Research has been under way for some time to devise a practical way to top pavements with a thin layer of concrete ( $\frac{1}{2}$  to 2 inches); but the difficulty of establishing a good bond between the old and new concrete had been a stumbling block. Some work with thin bonded toppings for limited areas, mainly bridge deckings, was successful; but no extensive project had been tackled until a badly scaled section of the Pennsylvania Turnpike was topped using this technique. The success of this project led to several other large scale jobs—U.S. 30 at West Burlington, Iowa; Little Rock Air Force Base, Arkansas; Selfridge Air Force Base, Michigan; and Campbell Air Force Base, Kentucky.

Thin bonded resurfacing is most often used for one of the three following reasons: (1) to repair surface deterioration of old roads or runways

caused by the action of chemicals, wear-and-tear, etc.; (2) to correct a faulty surface on a new pavement damaged during placing by freezing or any other cause; or (3) to renew and level a road being widened. It is not used to strengthen structurally unsound pavements.

### PREPARING THE SURFACE

As has been said, the key to success in this work is securing a good bond between the original slab and the topping. Proper preparation of the surface is the most important factor in achieving this bond. The number of steps and time needed to prepare the base slab for topping hinges on the condition of the surface.

First, loose concrete is removed with

Finally, acid etch the surface with commercial muriatic acid (27.9 per cent HCl). Wet down the surface before applying the acid to help dilute and distribute it. The acid can be spread from a tank truck equipped with a spreader bar, with a plastic hose directly from its shipping container or, on small jobs, it can be applied with hand sprinkling cans. As soon as foaming has stopped, flush down the road until it reacts neutrally to pH paper. Acid should be applied at the rate of one gallon per 100 square feet of pavement.

Should the scarified as well as unscarified area be acid etched? Opinions differ on this question. Some feel the extra work and material are justified by the better bonding conditions that

**A survey of all known street and highway concrete resurfacing projects last year included over 300 projects in 28 states; of these, 40 percent were rated as in excellent condition, 40 percent as good, 18 as fair, and only 2 percent as poor.**

jack hammers, chipping tools and/or a scarifying machine. All joints, cracks and patches must be cleaned of bituminous materials but no solvents should be used. If only patches of the pavement are faulted, sound concrete must sometimes be removed to maintain grade with an adequate thickness of topping. Scarifying is not employed to roughen the surface for better bond; it is used to remove unsound concrete. Studies have shown that a pavement surface that is only slightly rough, if clean, will bond well. After scarifying, the slab should be swept and blown clear of debris and dust.

Areas of the pavement that have not been scarified are scrubbed to remove oil, grease, paint and other foreign materials. Then, wet the pavement, sprinkle on a detergent, hand- or power-brush the surface and flush thoroughly.

result. Others don't agree. Probably the nature of the traffic which the pavement is to carry will determine if this added precaution should be taken.

### FORMWORK

Edge forms will be needed unless there is a slab adjacent to the area being resurfaced. These forms are used to support the finishing equipment. They should be carefully leveled to assure adequate depth of topping over the entire surface of the pavement. Forms held in place by power-actuated studs can be used if several lanes are to be placed. This reduces the amount of excavation needed.

If the pavement is to be widened as well as resurfaced, one of two methods may be used—either in one operation, using the specified topping mix for the entire new slab and topping of the

## SIX STEPS IN THIN BONDED RESURFACING



1. ABOVE: Loose and unsound concrete on the base slab is removed with chipping tools or scarifying machines. Afterwards the pavement should be swept clean of debris and dust.



2. LEFT: All bituminous material should be removed from joints and cracks without the use of solvents. These areas are then cleaned of loose particles with a compressed air gun.



3. LEFT: Sprinkle a detergent on the wetted pavement and hand- or power-scrub until all oil drippings, paint and dirt are removed. Flush thoroughly.

4. RIGHT: The pavement is then etched with commercial hydrochloric acid. First the surface is sprinkled with water and then the acid is applied. After foaming has ceased, the slab is rinsed. Etching should not be tackled on windy days.



5. BELOW: An important step in achieving good bond is the grout course. Just before paving is begun a creamy-textured grout is broomed into the surface. If considerable time has elapsed since acid etching, the slab should be brushed clean of dirt.



6. RIGHT: Once the surface is prepared, the regular paving train takes over. Joints should be carefully made and curing should be thorough. Reinforcement is needed only in 2-inch or thicker toppings.



## Recommended Trial Concrete Mixes for Thin Resurfacing

	Thickness of resurfacing, in.		
	1/2	1	2
Cement content!.....	94 lb.	94 lb.	94 lb.
Total water*.....	42 lb.	42 lb.	42 lb.
Fine aggregate**.....	190 lb.	170 lb.	190 lb.
Coarse aggregate			
Maximum size.....	3/4 in.	1/2 in.	1 in.
Amount**.....	115 lb.	170 lb.	230 lb.
Air content.....	9 to 11%	6 to 8%	5 to 7%
Approximate cement factor.....	8.5 sk/cu.yd.	7.5 sk/cu.yd.	7.0 sk/cu.yd.
Slump.....	1 to 4 in.	1 to 4 in.	1 to 4 in.

\*Including free moisture in the aggregates.

\*\*Based on saturated surface-dry aggregate, S.G. 2.65.

old slab; or in two operations, with the new slab cast to the level of the old pavement with a standard highway concrete mix and both sections topped with the special mix. If the latter method is deemed most economical, the widening slab should be left rough surfaced to provide a good bond between slab and topping.

### CONCRETE MIX

The usual considerations which govern concrete mix design hold true for topping mixes. Naturally, since these several steps have been taken to apply a new wearing-riding surface, the mix should be of high quality; that is, one that contains an air-entraining agent, makes use of abrasion-resistant aggregates and is of high strength.

Some trial mixes for toppings from 1/2 to 2 inches are suggested in the accompanying table. Slump is dependent upon maximum aggregate size and the weather—a 3- or 4-inch slump is desirable on windy, hot days and 1- or 2-inch on cloudy, cool days. Air content varies with the proportion between the coarse aggregate and sand. Remember that water will not be drawn from the mix by a subgrade; therefore, reduce your water content.

### PLACING AND FINISHING

A bonding course must be applied to the slab just prior to placing the topping. This bonding course uses a grout composed of one part cement to one part concrete sand with all plus No. 8 material scalped and enough water added to give a creamy texture. The easiest means of applying the grout is to hand broom it into the slab surface.

Placing and finishing operations are the same as for regular paving projects. It should be remembered, however,

that since the topping is very thin, placing operations will be three to nine times as fast as conventional paving. Therefore the rate of placing is dependent upon the speed of finishing rather than the placing equipment capacity. Mesh reinforcing is needed only for 2-inch or thicker toppings.

### JOINTING

All joints in the original slab must be duplicated in the resurfacing. They must be directly over the original joints and at least as wide. If a joint in the topping were to be narrower than the one in the slab below, pressures sufficiently high to break the bond between the slab and topping would be set up when the bottom joint closed. Joints also have to be provided between the resurfaced area and any abutting slabs.

There are several ways to make these joints. They can be sawed if their width is not excessive or a formed type of dummy groove joint may be used. Strips inserted in the old joints to form the new ones should be below the surface of the topping to facilitate finishing. After the concrete has stiffened they are removed and the joint edged.

Expansion joints can be formed with wooden strips or a non-extruding joint filler. The latter should always be used if the topping is 2 inches or thicker. They are placed in the old joint to within 1/2 inch of the topping surface and sealed above this.

The important thing to remember regarding jointing practices in this work is simply to provide the topping an opportunity to move identically with its base slab. If one is restrained and the other is not, bond troubles will naturally arise with the first advent of

thermal movement. If joints are logically placed, no difficulties should be encountered.

Curing is important in resurfacing due to its effect on bond. It should be started immediately after finishing, especially on hot or windy days. Except under exceptionally adverse conditions, a membrane curing compound will provide adequate curing. After curing and joint sealing, the road can be opened to traffic, fully restored to like-new condition.

### MORE TO COME

Like any relatively new technique in the field, there are improvements needed in thin bonded resurfacing. For example, large random cracks in the original slab act much as a formed joint would, with sympathetic cracking resulting. Experience has shown, however, that these cracks are usually close and tight enough that no grouting or sealing is needed.

At first glance it might appear that a rather large number of steps are required for this topping technique. Once crews are familiar with the work, however, it usually becomes a simple procedure. When compared with asphalt resurfacing specifications, this technique seems simple.

In any case, thin bonded resurfacing has proven its mettle in projects that date as far back as 1913. When new developments arise in this resurfacing technique, CONCRETE CONSTRUCTION will keep you informed. END

Readers who would like to have additional information on the subject discussed in the foregoing article may request it by filling out one of the reader service cards in this issue.





**SIMPLE EARTH MOUND FORM** eliminated falsework, simplified circumferential prestressing and speeded placement of concrete. Note uncompleted form for ring girder at base of the mound.

## Dirt cheap form for concrete roof

A MODERN MOUND BUILDER saved at least \$50,000 in shoring costs by pouring this auditorium roof dome on a mounded earth form . . . then excavating.

The 120,000 cu. yd. sand and gravel mound was built up and shaped within a ring of reinforced concrete columns varying with the terrain from 24' to 42' high. Excavating the mound left the dome sitting pretty on the columns.

Most of the 218' dia. shell was poured directly on the compacted earth. A 30' wide band at the periphery, the only part of the roof which is exposed in the completed auditorium, was lined with plywood panels to give the concrete a smooth under-surface. The 23' high dome tapers from 9" thickness at the periphery to 5" at crown. It is ringed by a reinforced concrete girder, post-stressed to 145,000 psi.

The 1000 cu. yds. in the dome were poured in 4 concentric lifts. Truck mixers chuted the first lift directly in place. Cranes took over the other 3 pours with the top lift handled crane-to-hopper-to-buggy. Placement was completed in 1½ weeks with on-schedule deliveries of material properly processed by truck mixers of certified design, capacity, mixing speed and water control accuracy.



**THIN-SHELL DOME** for Albuquerque, N. Mex. civic auditorium stands on ring of columns after excavation of earth mound. Shell has both radial and circumferential reinforcement. Architects, Ferguson, Stephenson & Associates; general contractor, Lembke, Clough & King. Both are Albuquerque firms.

TENSION was applied to high-strength wire in ring girder by a dynamometer instead of a die. The 655 wire turns were anchored individually and each layer grouted.



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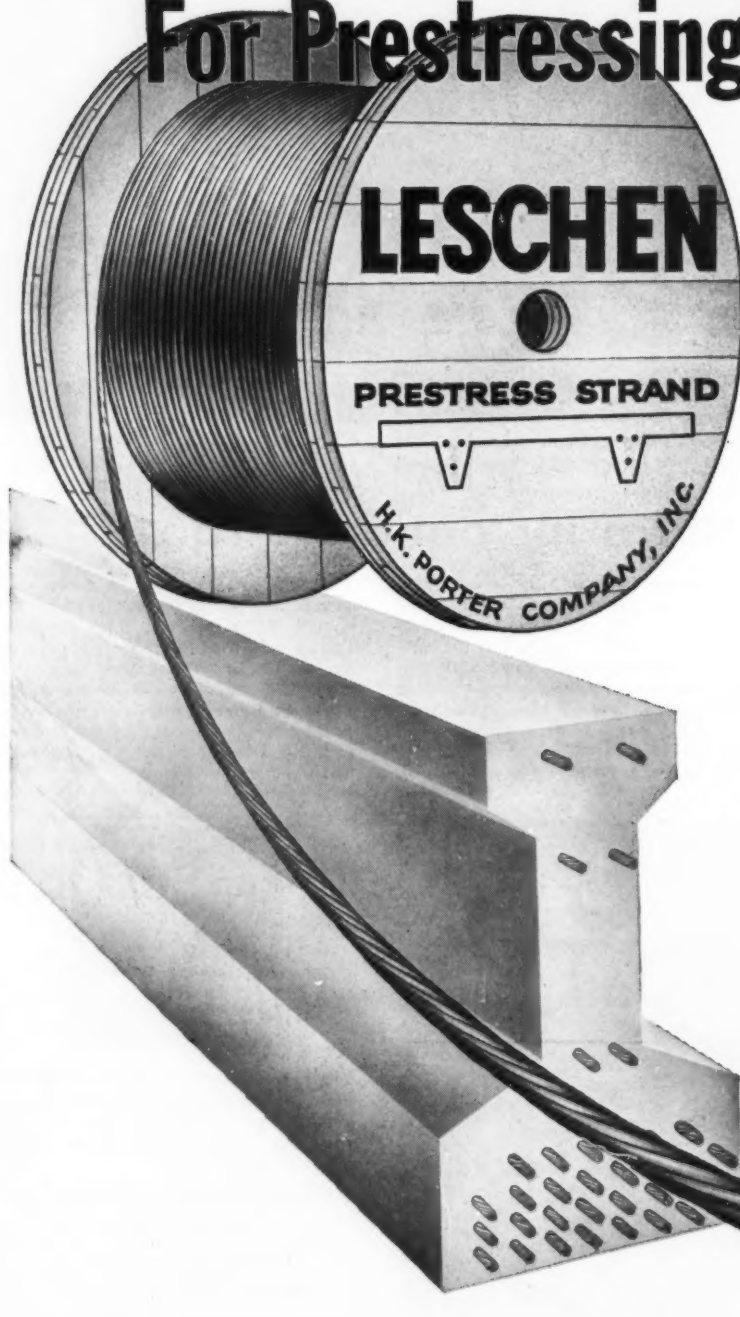
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# SILICONES MAKE MASONRY LAST LONGER AND LOOK BETTER

BY HAROLD L. CAHN<sup>1</sup>

IF THE INDUSTRIAL RESEARCH chemists who began concentrated work on silicones less than two decades ago could have looked into the future and seen the many ways silicones would be used, they would have been astonished.

And perhaps nothing would have been more startling to them than a section headed "Water Soluble Silicone (for Concrete Surface Treatment)" which appears in Public Works Specifications, State of New York, Department of Public Works.

The researchers would have been surprised because the use of silicones in masonry water repellents was one

of the applications for these materials which they completely overlooked. Yet the use of silicones in masonry water repellents is today one of the fastest growing applications of these versatile materials. This is because silicones can provide:

1. long-lived protection of masonry against the continual assault of weather;
2. easier maintenance of the natural beauty of masonry and,
3. increased highway safety

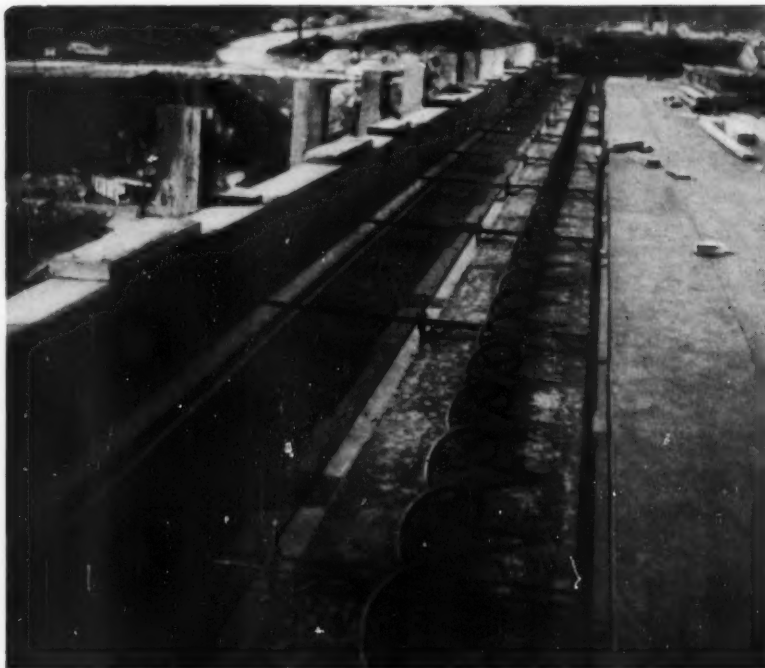
Their benefits were neatly summarized by H. B. Britton of the New York State Department of Public Works in

<sup>1</sup>The author is technical service engineer in the Silicone Products Department of General Electric Company.

The ability of silicones to impart water repellency is shown by this silicone-treated concrete specimen, made of light weight aggregate. Thanks to the silicone treatment, water

beads up on the surface, completely repelled by the normally highly absorbent concrete. Silicones make surfaces water repellent—not waterproof.





Support of these slab forms was quickly and easily accomplished from above with the Richmond Free Fit Hanger Frame-Ty. (Bridge above Ardsley over Saw Mill River Parkway—part of New York State Thruway construction; Raylin Construction Corp. and The Lynn Corporation, general contractors.)

additional advantage: all tightening is done from the top of the hanger by means of the nuts (see circle in large illustration), the Tyrag passing freely thru an oversized coil.



Standard Hanger Frame-Ty



Offset Hanger Frame-Ty



45° Fascia Hanger Frame

Dual uses of these Richmond Hangers have become standard: Fascia Hanger Frame-Tys used not only to hang the forms but also tie in the Fascia Ty; a variation of this is the 45° Fascia Hanger Frame for light overhang, where one 45° bolt supports the fascia overhang and hangs the form; Hanger Frame Screeds combine support of the deck forms with an adjustable base for screeding or supporting curb forms.

Richmond Hanger Systems have reduced the contractor's overhead in time and materials, added safety to his operation and improved the quality of his work. The various types of Richmond Hanger Systems and their applications are detailed in the NEW

## Study of Slab Form Support Shows Savings with Richmond System

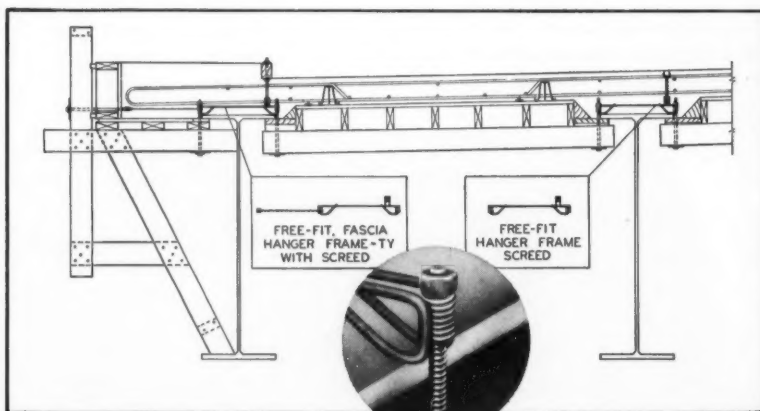
By what standards do contractors measure the effectiveness of flat slab form support methods? Which support systems are proving most helpful?

A survey brought out the following facts: *experienced contractors measure the effectiveness of flat slab form support systems in terms of three things: the degree of speed, safety and economy which they bring to a job.*

Loose wire is no longer used extensively because it meets none of the above three requirements. The use of wire beam saddles also is becoming less common. Although prefabricated to size, they are non-adjustable, and there is no positive means of tightening against the steel to prevent leakage of concrete.

Posting or "horses" are still used but this method is comparable to bracing wall forms. Prefabrication costs are high and erection is slow because of wedging and nailing usually required at the bottom flange of the beam. On high structures and deep beams this procedure is dangerous because the men have to reach down to the bottom flange to make the final tightening adjustment.

Richmond Hanger Frame-Tys are ideally suited to hang this type of



construction. These units in Standard, Free Fit or Offset types (see illustrations) can all be adjusted for various slab heights and haunch conditions. Their established safe working loads enable the contractor to take full advantage of lumber strength and hanger capacity.

Richmond Standard and Offset Hanger Frame-Tys can be erected with a minimum of reaching under the top flange of the beams. Richmond Free Fit Hanger Frame-Tys have an

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a paper presented recently before the Highway Research Board in which he said: "It is our opinion that the durability of concrete can be greatly increased if it is given a surface treatment of silicone. Our tests and experience clearly prove that any concrete surface treated with silicone will give better performance in that it will absorb less moisture, demonstrate greater light reflectance, repel intrusion of deleterious salt solutions and demonstrate a greater resistance to freeze-thaw action."

As this performance becomes better known in the building industry, silicones may become as indispensable to the builder as sand, their chemical cousin, has been for centuries. And while it is no more necessary to understand the chemistry of silicones to use them properly than it is for the mason to know that sand is silicon dioxide, a brief review may be of interest.

The silicones are an entirely new class of man-made materials in which the metallic element silicon is the central building block. Because silicon has the chemical versatility of carbon, the cornerstone of organic chemistry, the silicones have some of the outstanding properties of metallic and organic compounds. These include water repellency, exceptional durability, unmatched stability at high and low temperatures, release from sticking, and chemical inertness.

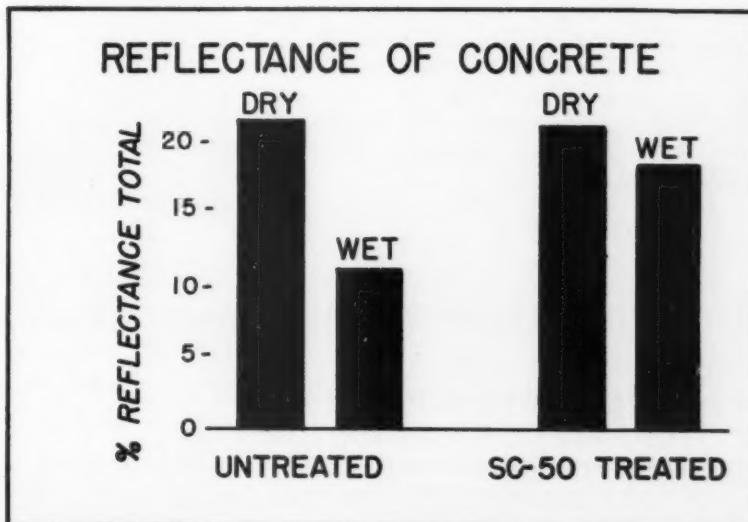
A combination of some of these properties makes the silicones an ideal base for durable water repellents which will minimize the harmful absorption of water by such varied masonry materials as concrete of all kinds, brick, mortar, limestone, cinder block, gypsum, slag block, and stucco.

(MORE)



**Figure 1:** The effectiveness of silicones in minimizing freeze-thaw damage to concrete is clearly shown by this photo of three concrete specimens after extensive testing in a Weatherometer. The silicone-treated samples at the top survived the rigorous tests in reasonably good condition; the untreated sample at the bottom was severely damaged.

**Figure 2:** This bar graph, based on data obtained in field tests, shows that a silicone-treated surface will reflect almost as much light when it is wet as when it is dry. Note how reflectance drops in the case of untreated concrete.

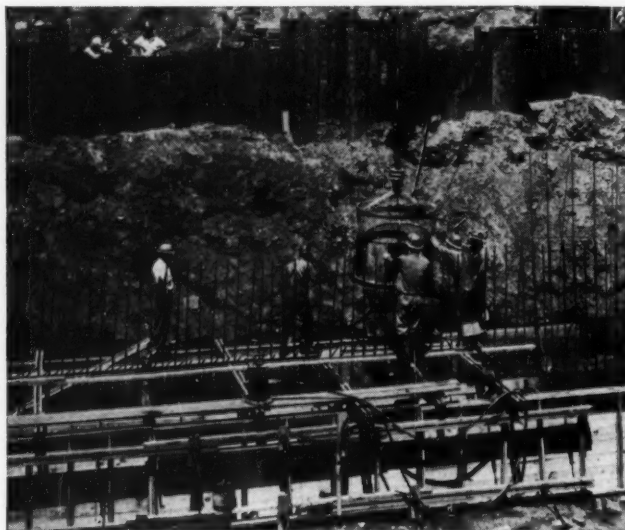


# COLUMBIA CALCIUM CHLORIDE

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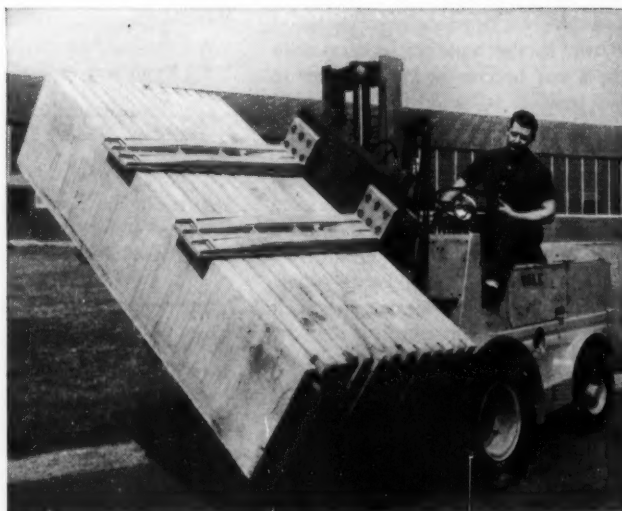
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## PROTECTION

Silicones do their protective job by making surfaces water repellent, not water proof. They function by lining the capillary pores of masonry and creating a huge hydrophobic or water hating area which repels moisture. And because they line the pores rather than fill them, they permit moisture formed or trapped behind or within a masonry structure to escape in vapor form. It is this distinctive behavior which explains the successful use of silicones in textile finishes, cosmetics and pharmaceuticals.

The importance of reducing moisture absorption and the effectiveness of silicones in performing this function are shown by Figure 1 (freeze-thaw block). This illustration shows the results of laboratory studies, and while laboratory data and experiments are always important, they are not as conclusive as closely controlled field tests. One of the first such series of tests, and one of the best, was run on the famed New York Thruway, located in an area where highways may be subjected to as many as 75 freeze-thaw cycles, 80 wet-dry cycles, and 35 salt applications annually.

One outcome of the extensive study by New York highway engineers on the Thruway was the adoption of its requirement that a silicone water repellent be applied to the concrete surfaces of all bridge structures built in the state.

While these are believed to be the first specifications of their kind for any phase of highway construction, specifications for silicone treatment of public, institutional and commercial structures have been adopted or are under consideration by various governmental bodies and agencies and corporations.

## APPEARANCE

In many cases, preservation of the appearance of masonry is as important as maintenance of its structural integrity. Here silicones enjoy distinct advantages. Because they are clear, colorless materials, they do not detract in any way from the natural beauty of the masonry on which they are applied. And they protect that beauty in three ways—by minimizing the physical degradation of the surface, by lessening if not eliminating efflorescence, and by greatly reducing the adherence of dirt and other soiling agents to the surface.

While efflorescence is chiefly a problem with brick, it can develop with many other types of masonry. It results when soluble salts in the masonry are dissolved by water penetrating the exterior. These salts are leached to the surface during drying, and the white, chalky deposit they form is as common as it is unattractive. Silicones combat the process by halting water at the surface.

Appearance problems also result when water absorbed by masonry carries dirt and grime with it. Dirt and

grime do not adhere readily to a silicone treated surface nor are they likely to be drawn below such a surface. Since release from sticking is one of the outstanding characteristics of silicones, the little grime eventually deposited and washed onto a silicone treated surface is readily removed.

While this feature of silicone performance is often overlooked, it is sometimes the sole reason why it is used by progressive contractors and architects.

## SAFETY

Silicones make their contribution toward increased highway safety by greatly lessening the darkening of highway surfaces, bridge piers, abutments and pylons during rainy and wet conditions. As Figure 2 indicates, a silicone-treated surface will reflect nearly as much light when wet as when perfectly dry. The data were obtained in actual field tests, but they are substantiated by laboratory data.

A graphic illustration of the difference in absorption and light reflectance is provided by Figure 3 (washout section). The safety benefit of this aspect of silicone performance is improved visibility and reduction of driving hazards in poor weather.

## TYPES OF SILICONE REPELLENTS AND APPLICATION METHODS

Two different types of silicone materials are available for use in water repellent formulations. One is solu-

**Figure 3:** Another graphic illustration of the effect of treating concrete with a silicone repellent. Here a severe rainstorm has washed away a portion of the fill around a

treated concrete bridge abutment to expose untreated concrete. The sharp color difference tells its own story. The treated surface repels dirt and grime as well as water.



ble in water, the other in mineral spirits or other hydrocarbon solvents. The water soluble materials are preferred for highway work. They are non-flammable and may be applied to dry or damp surfaces.

Solvent type repellents are preferred for brick, cement and cinder block and other types of masonry uses for buildings. While these repellents may be used in below-freezing temperatures, they can be applied successfully only on dry surfaces.

Both types may be applied by hand or low pressure spray equipment readily available to construction and maintenance crews and application can be accomplished by workmen with special training. Figure 4 shows the type of spray equipment used on the New York Thruway.

One fundamental rule is of utmost importance: neither type will perform as desired unless the formulation contains a sufficient silicone concentration. The general silicone industry recommendation for the solvent based materials is a silicone content of not less than 5 percent; for the water soluble repellents, not less than 2 percent.

Another important consideration is the condition of the surface to which the repellents are to be applied. Because the silicones function by lining the capillary pores, the surface should be clean enough to permit full access to the pores. It is further suggested that new concrete be allowed at least

14 days curing time before silicone treatment.

In order to determine whether complete surface coverage has been obtained, a fugitive dye is often used with the water soluble repellents. A common choice is phenolphthalein which will be visible from a few hours to a day.

#### APPLICATION RATES

As important as the silicone content of a repellent is the rate at which the repellent is applied. Even the finest repellent will prove unsatisfactory if applied in insufficient amount. This can be critical in using the water based silicone repellents for the obvious reason that second coats are impractical and may not be applied sooner than six months after the initial treatment.

Second coatings of solvent based materials may be applied within a few hours after the initial application. However this is rarely required except on very dense masonry which will absorb little of the first coat.

Rates of application will vary depending on the type of masonry but these general standards are suggested:

- 75-150 square feet per gallon on air-entrained and non air-entrained concrete
- 10 square yards per gallon for concrete pavement
- 75-100 square feet per gallon for porous masonry such as brick, cinder block, limestone

150-200 square feet per gallon for dense, smooth masonry with a second application usually required.

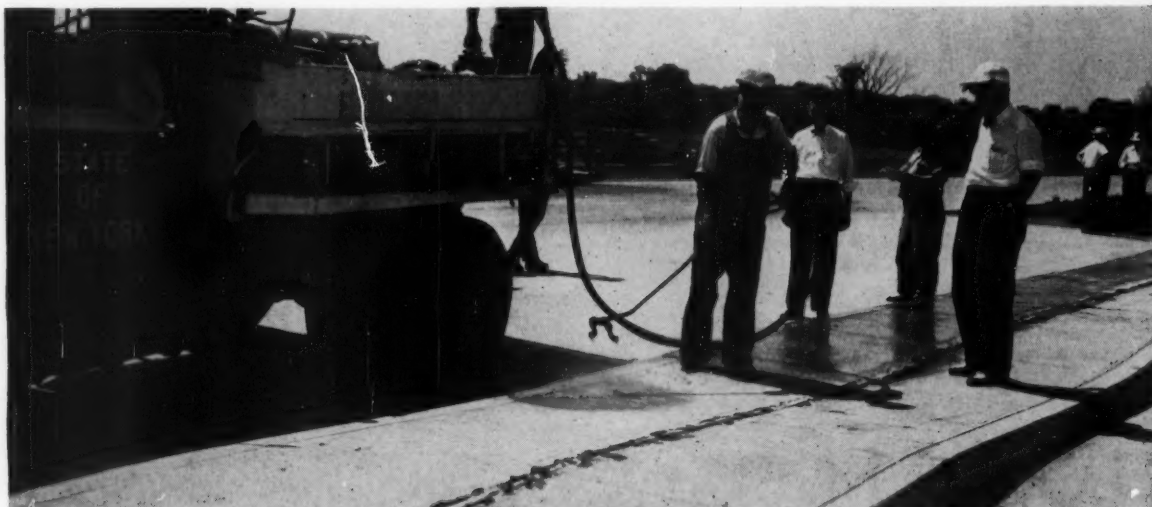
#### CONCLUSION

In the relatively short time they have been available to the building industry, the silicones have proven conclusively that they can provide durable protection to masonry and preserve its natural beauty. Leading formulators in all parts of the country have used their skills to supplement those of the basic silicone producers to make silicone water repellents readily available for every project regardless of size.

Sparked by convincing proof of silicone performance, sales of silicone masonry water repellents have increased about 20 percent annually in recent years. While this rapid progress cannot last indefinitely, all signs point to continued use of silicones by the building and construction industries in making masonry of all kinds last longer and look better. **END**

Readers who would like to have additional information on the subject discussed in the foregoing article may request it by filling out one of the reader service cards in this issue.

**Figure 4:** Spraying a section of concrete sidewalk on the New York State Thruway with a silicone repellent. A number of manufacturers offer equipment for this purpose.





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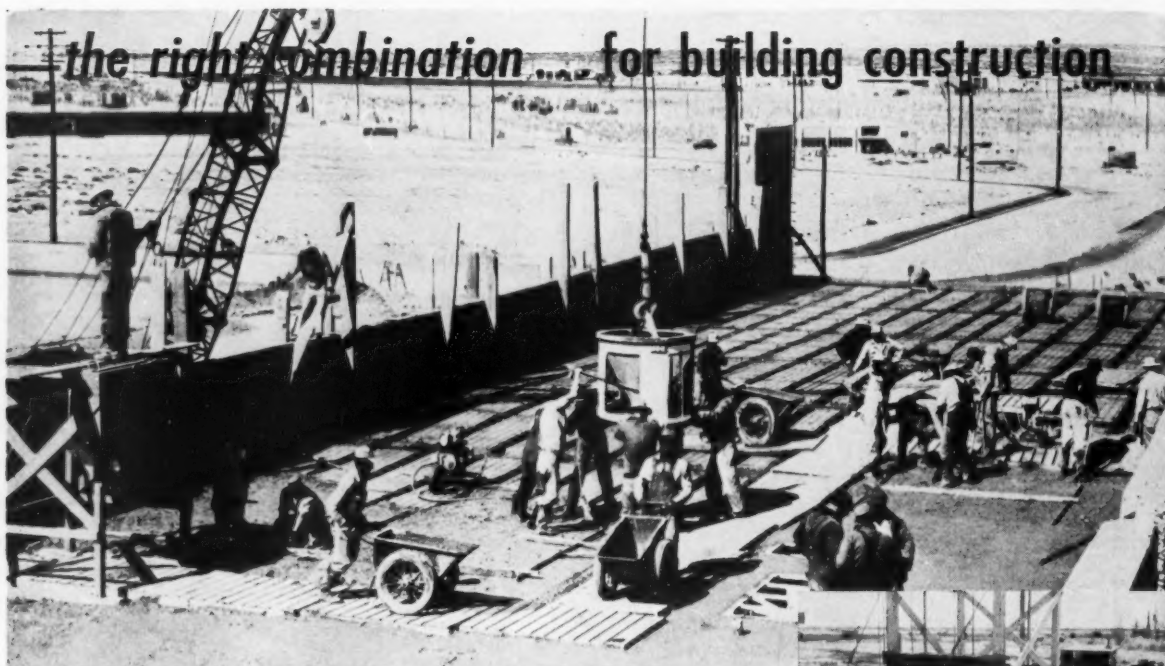
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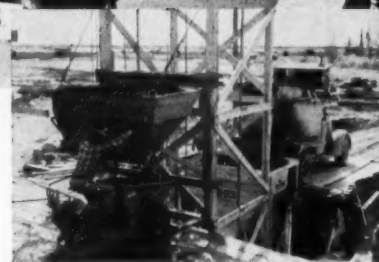
In the top picture, Gar-Bro buckets, floor hoppers and concrete carts were divided between two separate crews. One for mass concrete handling and one for slower paced slab work requiring finishing. Thus each crew set their own separate pace and prevented any costly delays.

Gar-Bro floor hoppers can be

converted to receiving hoppers for use with elevators as shown at right. Thus a crew with Gar-Bro power-carts can be continuously supplied with concrete on any floor of multi-floor building construction.

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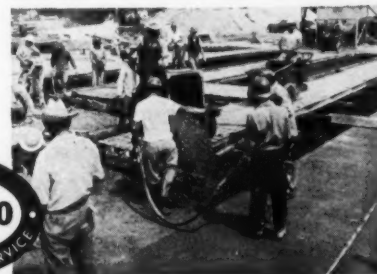


A Gar-Bro receiving hopper is used to receive concrete at base of tower and another as a tower hopper to charge Gar-Bro power-carts at floor level.



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FIGURE 1: The new ACI headquarters building in Detroit reflects this international technical society's desire for a structure which could meet the most critical scrutiny of the entire concrete construction industry.

## SHOWPIECE IN CONCRETE

**American Concrete Institute's new headquarters  
does top-notch job of demonstrating unlimited  
possibilities of construction with concrete.**

BY JOHN STRANG

CONSTRUCTION OF A NEW OFFICE BUILDING (Fig. 1) for the American Concrete Institute presented some unusual and difficult problems for the contractor. Exposed concrete was expressed structurally in the cantilever folded plate roof; exterior decorative concrete included thin precast, exposed aggregate panels set in aluminum window frames and heavier grade-level precast grills; interior decorative concrete treatment included two types of continuous fluting on the structural bearing walls.

Architect Minoru Yamasaki of Yamasaki, Leinweber & Associates, Birmingham, Michigan, had general

instructions to create a small but outstanding example of modern architecture featuring concrete. Since ACI is an international technical society, exclusively devoted to concrete, its directors demanded a building which would utilize latest improvements in the material, advances in concrete products development, modern structural design, and new construction methods. The result would be critically examined by every segment of the entire concrete construction industry, since ACI membership includes engineers, architects, contractors, concrete products manufacturers, cement, aggregate, and admixture producers, and every large agency using, testing, or approving concrete.

### ROOF CONSTRUCTION

The plan showed a reversed fold, folded plate roof cantilevered from each corridor wall. Deep X-shaped beams with diamond-shaped openings for skylights (Fig. 2) formed the tie across the corridor. The design was for cast-in-place construction but specifications permitted precasting at the contractor's option.

Knowing that the architect set high standards for finish appearance, the general contractor, Pulte-Strang Co., Ferndale, Michigan, selected the precast option for the folded plate roof principally because precasting the sections upside down permitted achieving sharp, formed lines for the surfaces to be exposed. Job-site precasting was undertaken since factory-cast prices

<sup>1</sup>The author is vice president of Pulte-Strang Company, Ferndale, Michigan, general contractor for this important concrete construction project.



from two local firms seemed high. Plastic faced plywood was used for three forms built on and anchored to substantial footings (Fig. 3). A dummy mock-up form was first used as a pattern for cutting the plywood and later as a jig for assembling all reinforcement in units. Pulte-Strang developed a transverse joint detail depending upon  $\frac{3}{8}$ -inch plates running along each edge of the section, welded top and bottom for moment resistance, and a longitudinal weld detail across the corridor. These details were approved by the structural engineer, Ammann & Whitney, New York and Milwaukee. A casting schedule calling for two units per day required 1500-psi concrete at 24 hours.

The concrete mix for the folded plate members had to meet severe requirements. First, the 72 different detail types of metal reinforcement, inserts, etc., in the  $3\frac{1}{2}$ -inch thick slabs made placing difficult and slow (Fig. 3) and required a  $\frac{3}{8}$ -inch maximum size aggregate. Due to the July heat at time of casting, a retarded set was required. Finally, the specifications required a 4000 psi average strength. A mix containing  $6\frac{1}{2}$  sacks of Type I cement and pea gravel aggregate was employed. With an average initial slump of 3 inches the set was retarded for about  $1\frac{1}{2}$  hours at concrete temperatures up to 95 degrees F. One-day strengths averaged 2100 psi. Initial curing under wet burlap for 24 hours was followed by a sprayed-on liquid membrane-forming white pigmented curing compound. The 28-day strengths averaged 5100 psi.

After 28 days curing, all units were turned over for patching and finishing on the top side. Threaded eye bolts for lifting and threaded socket inserts set flush kept patching of the top a minimum. All units were numbered and measured to determine over- and under-width tolerances. An erection sequence was prepared to avoid cumulative overrun. In spite of all precautions several transverse plates had to have opposing bulges trimmed by a cutting torch to secure the close fit required.

Roof units were erected as simple beams on falsework at the window line and the corridor bearing wall (Fig. 4). Two steel shims 4 inches high on the bearing walls plus the point support on falsework gave a stable three-point bearing that permitted adjustment to match adjoining

units. After completing main welds above the corridor and tie down welds to dowels in the bearing wall, a non-shrink grout was used to complete the center joint and bearing on the wall (Fig. 2). Transverse roof joints above the welds were completed to sharp edges with a patching grout containing a polyvinyl acetate emulsion as an admixture and as a bonding coat. A camber of  $1\frac{1}{4}$  inches was provided at the window line; immediate deflections averaged  $5/16$  inch. The windows are fixed by a sliding joint for live load and creep deflections. The exposed roof slabs are covered only by a sprayed vinyl treatment so that the architectural integrity of a concrete surface is retained.

## CAST-IN-PLACE WALLS

All substructure concrete walls were cast in 30-inch square steel forms. Form layout on all exposed walls was planned for symmetrical appearance. A smooth surface requiring patching only at the tie holes and finishing to fill surface air bubbles resulted. Exceptionally neat sharp corners and alignment were achieved as a result of the tight forms. One somewhat troublesome problem appeared in the library-conference room where the architect specified "random" sized half-round recessed fluting. Milled lumber half-rounds were attached to the metal forms by sheet metal screws located 8 inches on center. The results were acceptable but not entirely satisfactory

FIGURE 2: First floor corridor with fluting cast in walls. Precast roof sections have been connected and grouted across corridor. Skylights are to be installed in "diamonds" between deep beams.





FIGURE 3: Casting beds at job site—for roof sections. Note units stored on ground. Foreground—reinforcing placed in left form; finishing right section. R-M trucks dumped concrete on platform from where it was shoveled into forms.

to either contractor, architect, or painter.

The first floor corridor walls were completely decorated by fluting. This fluting is projected  $\frac{1}{2}$  inch from the wall surface and is trapezoidal in cross section. Plastic-faced plywood forms were used with milled wood fluting pieces attached. Since air temperatures up to 100 degrees F. were encountered, a retarding admixture was employed to avoid "cold joints." Again the decorative results were acceptable but not entirely satisfactory. In spite of the high quality form material and

careful form workmanship, careful casting, vibrating, etc., it was impossible to meet the architects' finish requirements without a great deal of hand labor in patching corners, grinding, and finishing surface air bubble marks.

Architects wishing to secure extremely fine surface and sharp corners in decorative concrete fluting might help reduce finishing costs and avoid difficulty by planning the structure so that these decorative wall areas could be precast with the fluting horizontal on the form. Precasting the corridor

walls on the ACI office was not considered feasible with a precast roof due to difficulty in making the joints at floor and roof structurally continuous.

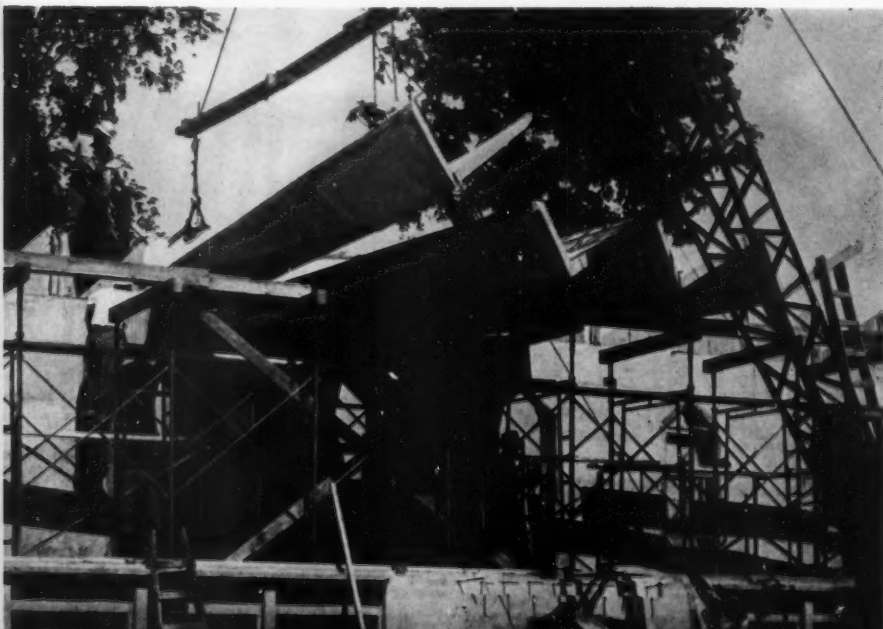
#### MATERIALS

The specifications required all aggregate for exposed concrete to conform to ASTM C-33 limits on deleterious material. In the Detroit area most natural gravels contain more deleterious material, causing "popouts" after freezing and thawing. Therefore, premium aggregate produced by heavy-media separation was used in the concrete for roof, building walls, and paving. Aggregate was furnished by American Aggregates Corp., Detroit. All concrete was ready-mixed concrete, furnished by Frank J. Knight Company, Detroit.

The first floor forms part of the heating system as the longitudinal ducts in precast concrete Flexicore planks carry heated air in the winter or cooled air in summer from the central supply ducts to outlets. The outlets are arranged near outside walls to provide a screen of air at desired temperature between office workers and the all-glass walls.

All exterior concrete is to be painted with a water-thinned polyvinyl acetate emulsion paint. This type of paint was selected to provide a "breathing" coating which would not be too absorbent to contamination by industrial smoke and soot. END

FIGURE 4: Erecting roof slabs.



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## books

**Building With Tilt-Up.** By F. Thomas Collins. Published by Know How Publications, P.O. Box 488, Eugene, Oregon. 160 pp. Illus. \$10.00.

With the increasing interest in tilt-up construction in the building industry, this new edition of the second volume of Mr. Collins' series on this subject will fill a need for a source of reliable information. Illustrations include charts, photographs and diagrams all of which serve to clarify the material in the book. Cost estimating is discussed in the opening chapter and other chapters deal with fill, subgrade, and quality of the floor slab and why these are so important in this type of construction, wall panel fabrication, hot and cold weather concreting, wall footings and special foundations, lifting operations, erection and bracing and joinery. Five appendices contain information on concrete mix design, prestressing in tilt-up, and other subjects related to good tilt-up work.

**The Structures of Eduardo Torroja—An Autobiography of Engineering Accomplishment.** Published by F. W. Dodge Corporation, 119 West 40th Street, New York 18, New York. 209 pp. Illus. \$8.50.

Despite the fact that little has been published about him, Torroja's works have aroused tremendous interest among architects, engineers and builders throughout the world. In his first published summation this great Spanish architect-engineer presents 30 of his most significant structures. Among them are bridges, churches, viaducts, stadia, water-towers, factories, dams, hangars, a hospital and a restaurant. Many are of reinforced concrete, for Torroja's most unusual engineering feats are in prestressed and post-tensioned concrete. The text of the book follows the author's reasoning during the design of each of the 30 structures. The whole progress of each design is discussed, from the initial conception through modifications and improvements to completion.

Poverty in Spain following the Civil War made it necessary to dispense with expensive construction methods

and decorative trimmings, and this is reflected in the purity and beauty of Torroja's designs. In his foreword to the book Mario Salvadori, professor of civil engineering at Columbia University, says of this aspect of the designs, "As has so often been true in the history of creative achievement, the limitations themselves—the very factors interfering with the solution of a problem—enhance the intrinsic value of the final product."

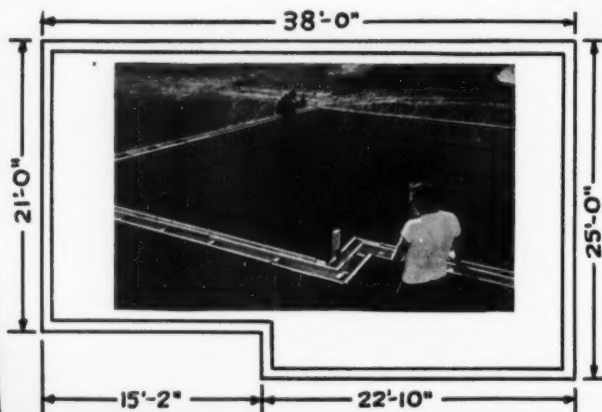
**Fundamental and Practical Concepts of Soil Freezing.** Presented at the Thirty-Sixth Annual Meeting, January 7-11, 1957. Bulletin 168. Published by Highway Research Board, 2101 Constitution Avenue, Washington 25, D.C. 205 pp. Illus. \$4.00.

The nine reports in this bulletin add much to the published information, both practical and theoretical, concerning the fundamentals of the soil-water freezing phenomenon. Three papers deal with the practical aspects of the relative thermal conductivities of different soils and pavements as they influence soil temperatures, the ability of

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engineers to compute pavement temperatures from data contained in weather reports, and loss and recovery of bearing capacity of a wide range of soil types.

Some evidence is given that the freezing point depression at the ice-water interphase determines the soil moisture tension that acts as the driving mechanism. Other evidence is presented to validate the theory that the upward flow of water toward the freezing zone is not accompanied by vapor diffusion; and experiments show that a capillary meniscus disappears as water comes into contact with the downward freezing ice lens. Additional measures have been made of the relative amounts of frozen and unfrozen water in various types of soils—and the influence of that water on the properties of the soils. A discussion of available knowledge concerning thermal conductivity of soils and similar granular systems follows.

**The Professional Construction Estimator Labor and Material Calculator.** By Jaques Ing Cramer Priest. Published by The Professional Publishing Company, P.O. Box 6, Laguna Beach, California. 184 pp. \$15.00.

This pocket-sized manual is well indexed for quick reference and bound in loose-leaf fashion for convenience. The first section is devoted to a discussion of the importance of good estimating for bidding purposes. The remaining twenty sections of the book are in table form and relate to every phase of building. The author states that unless estimating is done properly it becomes merely a guessing game and it is his hope that the book will aid estimators to eliminate this guess-work and enable the contractor to execute the job at a reasonable profit.

**PCI Specifications for Post-Tensioned Prestressed Concrete.** Prepared by a sub-committee on Post-Tensioned Prestressed Concrete. Published by PCI Publication Office, 3132 N.E. Ninth Street, Fort Lauderdale, Florida. Single copies, 35c each; twelve copies, 20c each; 100 or more copies, 15c each.

Readers concerned with post-tensioning of prestressed concrete will find this book a valuable addition to their files. The committee has done an outstanding job.

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**Viberette**



## in prestress work in narrow forms

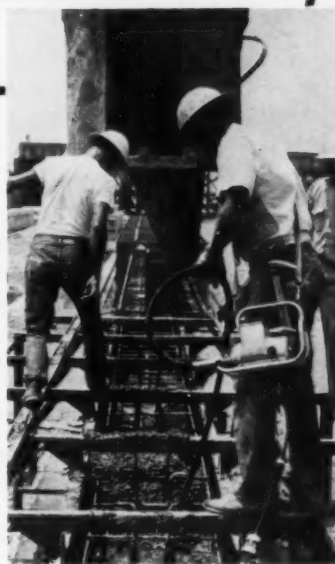
Hard-to-reach places and narrow stems of prestress T-sections are no longer a problem when the new Viberette Vibrator is on the job. It is designed especially for prestress and narrow form building construction.

The 12,000 rpm speed and low amplitude of Viberette produces extremely effective vibration in consolidating low slump concrete.

A small diameter flexible drive with replaceable rubber tipped head makes it ideal for concrete compaction in constricted areas.

A powerful, universal  $\frac{3}{4}$  HP electric motor gives Viberette plenty of "kick" for thorough vibration.

The 19 lb. Viberette Vibrator with new, dual grip, skid type handle makes the entire unit easy for one man to operate. A new shoulder strap attachment leaves both hands of operator free to manipulate the flexible drive.



## Features

Interchangeable heads—1", 1-5/16" and 1-3/4" dia.

Flexible drive lengths—1' to 20'

Quick release drive connection

Replaceable rubber or steel tips

Contact your dealer or write direct for detailed information.

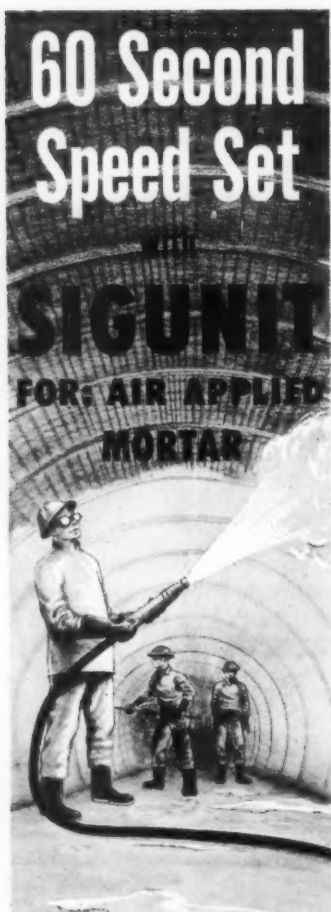
Viber Company, 726 South Flower Street  
Burbank 78, California



# VIBRATORS

Pioneers and leaders in the manufacture of vibrators.

Circle #430 on mailing card



Sigunit makes air-applied mortar rapid-setting and water resistant. Sigunit is well suited for work on tunnel linings, sea walls and spillways as it adheres to damp and leaking concrete surfaces. Water and rising tides will not wash out or cause structural weakness at the waterline.

Sigunit saves time and money by helping maintain your job schedule. For complete information, write or wire for Bulletin SIG-56.

Ad. No. 26-8



## letters to editor

### Uniform Curb Design

Sir:

We have received our April copy of *CONCRETE CONSTRUCTION* and were very interested in the article entitled "Uniform Curb Design" by Mr. R. S. Malloch of the Hogan Company. We were particularly interested in the cut on page 9 showing a sliding curb and gutter form in use.

Our company makes a sliding curb and gutter form very similar to the one shown in this article and at the time we were developing this product we spent considerable effort in doing some research in determining the various cross sections of curb and gutter used throughout the country. Needless to say we were truly amazed at what we found.

The basic design of our form was made to conform with the Iowa Highway Division cross section of 1949. It is, of course, widely used in this state and has been acceptable to contractors

who are using our forms in some of the adjoining states. However, we have built a number of forms to shapes which were specified by the contractor in order that they might conform to local requirements.

Contractors who have been using our forms have been extremely well pleased with their performance and cost reduction features. The uniformity of the appearance of integral curb, or curb and gutter, laid with our form has prompted the Iowa Highway Commission to specify the use of this type of form on projects which are under their jurisdiction.

I would appreciate it if you could send us the address of Mr. Malloch in order that I might write him and advise him of our appreciation of his efforts in trying to standardize curb design.

M. A. COPLEY  
Vice-President

Midwest Metal Stamping Co.  
Kellogg, Iowa

**Colored ready-mixed Concrete**

**10 DIFFERENT COLORS**

ECONOMICAL—costs very little extra per square foot . . .  
DURABLE—color all-the-way through the concrete . . .  
PERMANENT—to weather and sunlight . . .

For further information and color card write to  
**FRANK D. DAVIS CO.**  
3285 E. 26th STREET LOS ANGELES 23, CALIF.  
eastern office:  
P.O. BOX 292 NIXON, NEW JERSEY

## equipment tools materials

Additional free information concerning any item described in these columns may be obtained by filling



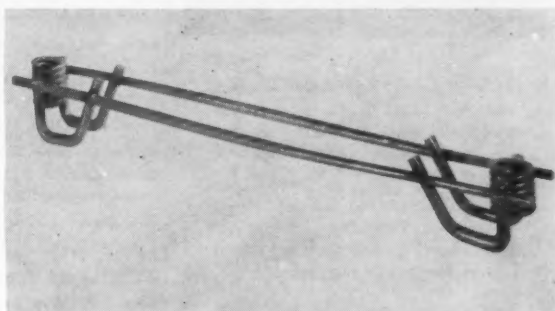
out and mailing the postage-free reader service cards located between pages 18 and 19 in this issue.

### Sealer

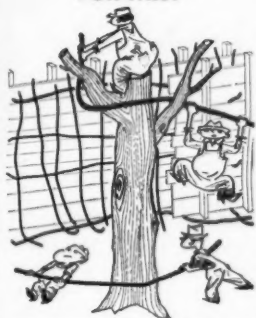
Applied to new concrete when dry enough to walk on, Treet Creet seals the surface and dries in 6 to 8 hours. The floor may then be used for traffic. It eliminates the need for wetting-down during curing and extends curing time from the usual 6 to 10 days up to 90 days. Dusting and penetration of dirt and oil are prevented. Used on old concrete after thorough cleansing, the material dries within an hour and seals the floor. **Magee Chemical Company, 325 West Main Street, Bensenville, Ill.**

### Coil Hanger Frame

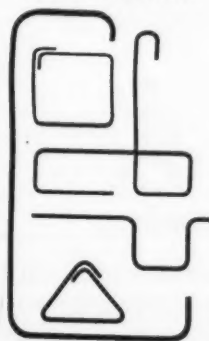
According to the manufacturer this coil hanger frame for supporting form work on beams features a completely new design, making it stronger and more stable than other types of frames. Tested on a 12-inch beam flange, it carried a total load of 10,400 pounds before showing any signs of strain. Frames in various widths and with one or both coils on a 45-degree angle, standard style frame with bolts threaded into the coils and types for extra heavy hanging are available. **The Dayton Sure-Grip and Shore Company, 301 Kercher Street, Miamisburg, Ohio.**



Are YOU Paying  
\$4.00 per hour  
FOR THIS?



You CAN do this!



## CLYDE STEEL BENDER for \$39.95

PATENT PENDING  
**A Manually Operated Tool for  
Bending Reinforcing Steel on the Job Site  
Accurately . . . Quickly . . . Inexpensively**

- ▶ Will bend  $\frac{1}{4}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{5}{8}$ ,  $\frac{3}{4}$  inch steel, any length, any angle, any shape.
- ▶ Mounted by you on a 4 foot 2 x 8" plank. Weighs only 24 pounds and can be thrown in the back of a pick-up truck.
- ▶ Quickly adjusted to produce six different radii of bends to conform with all building codes.
- ▶ Adjustable to produce a series of identical shapes of any angle, radii of bend and length, as required.

This is a tool which now enables concrete contractors, steel workers, contractors, masons, etc., to shape and bend reinforcing steel on any job site to meet actual job requirements. A simple, rugged tool that is fool-proof, durable and unbreakable. Absolute accuracy and uniformity in bending steel to any desired shape. It is easily operated by any unskilled workman, and will easily pay for itself in one or two jobs.

Available at your construction supply dealer, or send check, money order, or C. O. D. parcel post, 12 lbs.

**CLYDE MANUFACTURING COMPANY**  
A CORPORATION

BRIDGEWAY & TURNEY • SAUSALITO, CALIF.

Sold without plank, in a 5 x 5 x 42" carton, shipping weight 12 pounds. Complete with bolts and instructions.

*Completely guaranteed for workmanship and materials*





## HOW TO RUB or GRIND CONCRETE



Today, more and more builders specify a fine finish for concrete walls and ceilings. Because of this new requirement, and of the time and expense involved for hand finishing large areas, Stow Manufacturing Company has developed two, easily portable flexible shaft grinders for finishing concrete. These grinders are electrically powered.

Two methods are used to smooth off hardened concrete: wet rubbing and dry grinding. Wet Rubbing—required for smoothing green concrete to a plaster-like finish. Use slow speed grinding wheel or disc. Apply water while grinding. Wet concrete can also be painted on with a brush, then smoothed into holes with the grinding wheel. Dry Grinding—use a high speed grinding wheel or abrasive disc to smooth dry concrete.

Either of Stow's portable, electric grinders, the ½ HP model G40-C or the ¾ HP model JT-50, can be used for wet or dry grinding. Both models are available with open or totally enclosed motors, and are equipped with 8 or 12-ft. flexible shafts. Angle heads with different speed ratios can be selected. Write for STOW's pamphlet, Grinding Concrete for complete information on proper speeds, grinding discs and wheels for both wet and dry concrete finishing. Stow Manufacturing Co., Binghamton, N.Y. also makes a complete line of concrete vibrators, rotary trowels, and screeds.

**STOW MANUFACTURING CO.**  
354 Shear St., Binghamton, N. Y.

Please send me your pamphlet, **GRINDING CONCRETE**.

Name.....Title.....

Company.....

City.....Zone...State.....

Circle #423 on mailing card

## equipment and tools

For additional free information mail cards facing page 18.

### Curing Compound

A new, white-pigmented concrete curing membrane is compounded so that particles of materials are dispersed, giving greater suspension. The result is a heat-reflecting concrete curing agent that offers uniform consistency and the maximum in moisture retention, according to the manufacturer. It flows freely and is unlikely to clog or contaminate spraying equipment. A successful test program on Wisconsin highways was conducted with the material during 1957. The membrane is custom mixed on order to meet specifications of any State Highway Department. Write **Thiem Products, Inc., 9800 West Rogers Street, Milwaukee 19, Wisconsin.**

### Tachometer

A slide rule tachometer in a leather case checks speeds of motors, vibrating equipment and internal combustion engines. The device is simple, accurate, and inexpensive and there are no intricate parts to get out of order. **Viber Company, 756 South Flower Street, Burbank, California.**

### Reinforcing Bars

Concrete reinforcing steel bars, fabricated to specifications, are now being supplied at the St. Louis plant of Joseph T. Ryerson & Son, Inc. The reinforcing bar service to the construction industry, previously confined to straight lengths, now includes bending to shape ready for placement in the forms. Bars are tagged for ready identification according to the setting plans, the manufacturer has announced, with deliveries timed to the progress of the job. Reinforcing steel accessories, wire fabric, open web steel joists, plates, sheets, beams and other structural shapes round out the company's service to contractors. Write **Joseph T. Ryerson & Son, Inc., 5 Clinton Street, St. Louis, Mo.**

# NEW

## FOR PRESTRESSED CONCRETE



## FLEXON STRESS-FLEX TUBING

- Specially Designed for use in post tensioning concrete
- Easy Field Use because its flexibility is right for prestressed concrete
- Proven under field conditions
- Costs Less

Here's flexible steel tubing you can use with confidence in prestressed concrete . . . yet it costs you less than ordinary tubing. In Flexon Stress-flex you get the strength and flexibility you need—you don't pay for unneeded extra steel. And it's backed by over 56 years' experience in flexible tubing. Ask your nearby Flexonics Representative for full information or write direct.

RT-13



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In Canada: Flexonics Corporation of Canada, Limited, Brampton, Ontario • Also Manufacturers of Rubber and Metal Hose Assemblies • Expansion Joints • Aircraft Components

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**CONCRETE CONSTRUCTION**



## equipment tools materials

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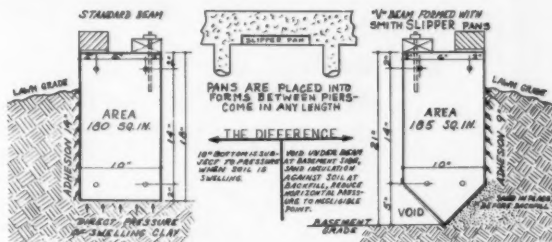


### Prefabricated Falsework

The roof slab on the TWA hangar at New York's International Airport was constructed in 60-foot sections. Two sets of traveling falsework supported the roof sections until concrete acquired strength of 2500 psi. Tension cables then took the load, and falsework was moved into position for pouring adjacent sections. Time required for lowering, moving and re-positioning falsework sections averaged 1½ days. The picture shows falsework in position for placing reinforcing steel for the concrete shell roof surface. **Timber Structures, Inc., 3400 N.W. Yeon Avenue, Portland 8, Oregon.**

### Slipper Pans

Relief from damaging pressures against beams is provided by inserting Smith Slipper Pans into any 6-, 8-, 10-, or 13-inch forms before tying in the reinforcing steel. The pans separate or divide the rising soils with a sharp edge and allow the soil to rise along two slick, sloping surfaces. Pans are usually left in place to disintegrate, leaving permanent cleavage and slippage. Economies in excavating, concrete, stripping time and labor minimize initial cost, according to the manufacturer. **E. Ray Freeman, 9823 Buxhill, Dallas 18, Texas.**



## Announcing the NEW Gates PlastiCone FORM TIES

Canadian and U.S. pat. pending



with full 1" or 1½" break-back  
for the finest architectural finish concrete.

- PROVIDE POSITIVE BREAK-BACK
- PRACTICALLY ELIMINATE SPALLING
- PREVENT BLEED AT TIE-SLOT
- NEVER NEED OILING

#### HERE'S HOW THEY WORK:

As the concrete is poured, pressure forces the molded, polyethylene cones against the panels, forming a void around the ends of the ties, and at the same time, covering the slots and preventing bleed.

Since concrete cannot adhere to their glass-smooth surface, the cones can be removed and ties broken back immediately after stripping the forms. This means that all grouting and filling is accomplished on "green" concrete for the finest architectural finish possible...without costly delay.

For detailed information on the new Gates PlastiCone Ties see your nearby Gates Dealer, or write to:

## Gates & Sons, Inc.

80 SO. GALAPAGO STREET

DENVER 23, COLORADO

Branches in Spokane, Wash., Rochester, N.Y., Lethbridge, Alta., Canada



C.C. 7/58

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# STEEL STAKES by dee

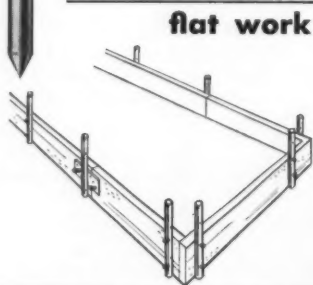
Patented

Always drives straight in  
any type of ground  
12 nail holes 1" o.c. spir-  
ally arranged at 30°  
24 nail entry points

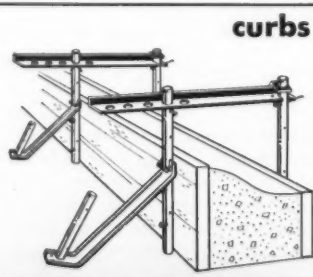
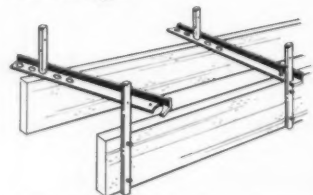
Always a Positive  
Nailing Position  
Regardless of  
Axial Rotation

Set up 10 times faster  
Strip 20 times faster  
Get 100 or more reuses

**SAVE TIME**  
**SAVE MATERIAL**  
**MAKE MONEY**



flat work

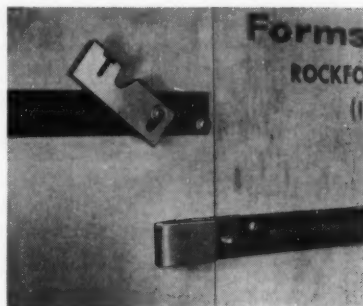


**dee CONCRETE PRODUCTS CO.**  
(Licensed Manufacturer)  
670 North Michigan Avenue  
Chicago 11, Illinois  
MOhawk 4-3664

Circle #407 on mailing card

## equipment tools

Additional free information concerning these items may be obtained by mailing the reader service cards located between pages 18 and 19.



### Step Hardware

Designed to simplify multi-level foundation setting, this step hardware assembly fits either inside or outside panels and can be nailed to the forms in a few seconds. Two holes are provided for nailing. The unit consists of a 3-inch, hardened steel locking lever and an open-end, U-shaped channel. **Simplex Forms System, Inc., Rockford, Illinois.**

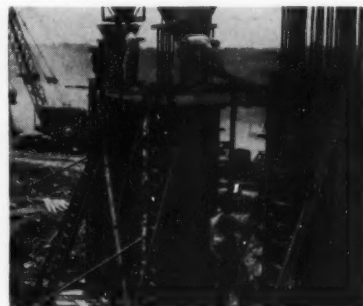
### Paving Form

The circular, sliding lock in this highway paving form eliminates slogging and provides a more rigid joint between rails. By levering forward, the snug-fitting lock pipe is instantly slid into locking position. An auxiliary locking pin in the lower right corner is tapped into place to prevent forms from tilting. **Super Form Company, 16 East Broad Street, Columbus, Ohio.**



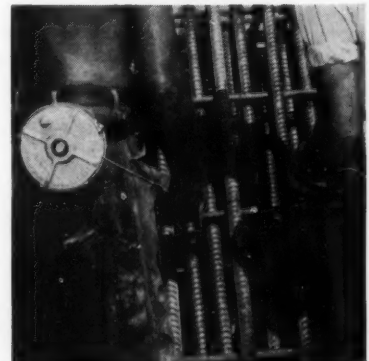
### Steel Strapping

According to this manufacturer, placement of strapping on forms for both columns and piers takes less than half the time required with any other reinforcement method and strapping can be removed in one-tenth the time otherwise needed. Low-cost steel strapping is discarded after forms are stripped, eliminating cleaning and storing expense. **Acme Steel Company, 135th Street & Perry Avenue, Chicago 27, Ill.**



### Tie-Wire Dispenser

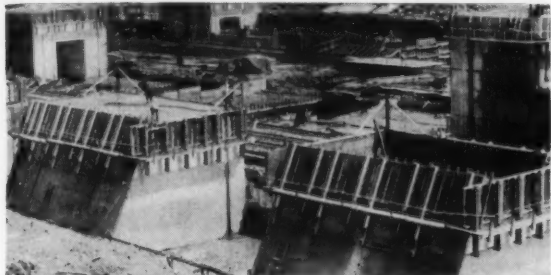
A new tie wire reel-type dispenser eliminates coil-over-shoulder wire tying of reinforcing bars. Design permits either right-hand or left-hand usage. The manufacturer states that the danger associated with a coil of wire slung over the shoulder is eliminated, tying is faster and waste is eliminated. **Ideal Reel Company, 1424 Madison Street, Paducah, Kentucky.**



CONCRETE CONSTRUCTION

## equipment and tools

For more information mail cards facing page 18.



### Steel Forms

Nearly 5,000 lineal feet of adjustable cantilever steel forms are being used to form the new Markland Locks at Warsaw, Kentucky. The installation is one of three Corps of Engineers projects designed to eliminate thirteen obsolete Ohio River locks. The contractor is building two 110-foot wide locks, in lengths of 600 and 1200 feet. Two guard walls, each more than 1000 feet long, will be built at either end of the locks. The forms are designed for pouring 5-foot lifts. **Blaw-Knox Company, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.**

## perfectly cured and hardened CONCRETE at a cost savings with DEMICON Cure Hard

One application of DEMICON Cure-Hard to freshly poured concrete surfaces will give you:

a perfect membrane that retains moisture and prevents cracking

a dust-free, chemical-resistant, hardened surface

a cost savings—material applied for less than 1¢ per square foot



### McMILLAN FLOOR PRODUCTS CO.

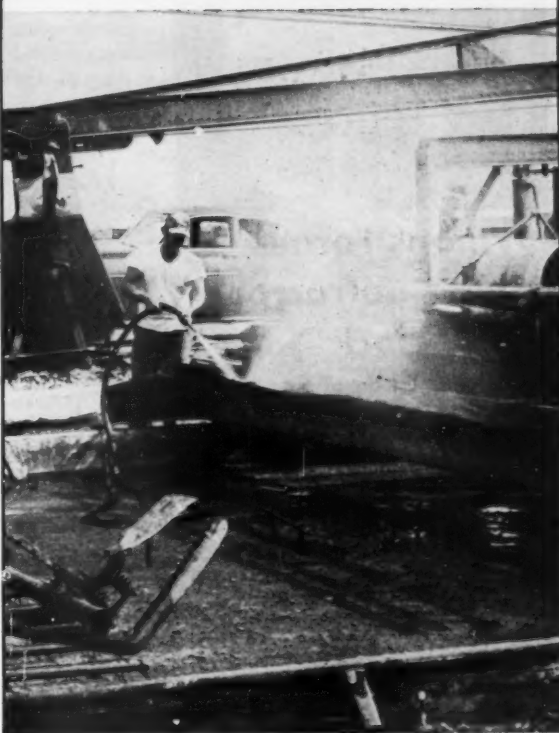
2045 East Eight Mile Road Hazel Park, Michigan

For FREE Information write direct or use Reader Service Cards

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## More EFFECTIVE WASHDOWN

for  
**TRUCKS • PAVING MACHINERY  
MIXERS • EARTH MOVERS**  
**CLEANS RIGHT DOWN TO THE PAINT!**



- ELIMINATES CHIPPING AND SCRAPING
- EXPOSES ALL LUBRICATION FITTINGS
- KEEPS EQUIPMENT LOOKING NEW

This compact, portable washdown pump is powered by a four cycle gasoline engine. Can be used anywhere. Self-priming, no check valves. Delivery to 40 gpm—pressures to 150 psi.

WRITE FOR FREE ILLUSTRATED BOOKLET  
ON MODEL 6600 WASHDOWN PUMPS.



### MARINE PRODUCTS COMPANY

515 LYCASTE DETROIT 14, MICHIGAN

**FLOMAX**  
SELF PRIMERS

**MP STRAIGHT**  
CENTRIFUGALS

**DURAFLEX**  
ROTARIES

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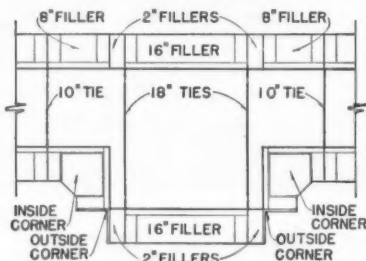


## Power Plant Forming



### Symons Forms Help Contractor Race Clock Pour 530 Yards of Concrete in 5½ Hours

Racing a siege of wet, windy weather, workmen on the new \$10 million Blue Valley Station of the Independence, Mo. power plant, teamed up to pour 530 yards of concrete during one 5½ hour period.



Pilesters similar to the ones shown are easy to erect with Symons Fillers and Corners.

Sharp Bros. Contracting Co., Kansas City, the contractor, is using 8,000 square feet of Symons Standard High Strength Forms to pour 40,000 square feet of concrete. Much of the concrete is in thick slabs and pedestal bases with wall thicknesses varying from six to 84 inches. Symons 84-inch washer ties are being used in pouring pedestals for the turbines.

You can rent Symons Forms, Shores and Column Clamps with purchase option. Information on Symons products upon request.



**SYMONS CLAMP & MFG. CO.**

4271 Diversey Avenue, Dept. G-8  
Chicago 39, Illinois  
Circle #425 on mailing card

## equipment tools and materials

Additional free information concerning these items may be obtained by mailing the reader service cards located between pages 18 and 19.

### Technical School

Sika Chemical Company has just completed the first session of the 1958 technical schools for its engineers, construction men and dealers. These sessions have been a regular feature at the company's plant for seven years. The firm manufactures a complete line of chemical additives for improving the quality of concrete and compounds for waterproofing. **Sika Chemical Corporation, 35 Gregory Avenue, Passaic, New Jersey.**

### Plywood

Simpson high density overlaid plywood is said to save 30 percent on concrete forms and finishing costs. Contractors have obtained 75 reuses in normal construction service. A wipe-down with brush or rag is all that is needed to clean forms after stripping, and only light oiling is required for easy parting. Excellent water repelling characteristics make drying faster so that sheets can be stacked without dividers immediately after dismantling forms. High density overlaid plywood is exterior grade Douglas fir plywood armored to give it toughness and smoothness. Sheets of Kimpreg, a cellulose fiber impregnated with phenolic resin, are bonded to the face veneers under heat and pressure. **Simpson Logging Company, 1010 White Building, Seattle 1, Wash.**

### Densifier

Densicon, an activated densifier for concrete floor surfaces indoors or out, protects against chemical damage and dusting, while increasing resistance to traffic wear, according to the manufacturer. It is applied in liquid form with a long-handled brush. It is said to penetrate deeply into capillaries of the surface and then crystallizes to assure structural density. Two applications, 24 hours apart, are claimed to be equivalent to that of 3 coatings with concrete hardeners. Surfaces breathe and permit water vapor transmission, a

feature important in on-grade floors. It reduces absorption of oils, greases and the effects of freeze-thaw cycles, is non-flammable, odorless and does not darken surfaces. Floors can be used immediately after application. Write **Maintenance, Inc., Wooster, Ohio.**

### Concrete Vibrators

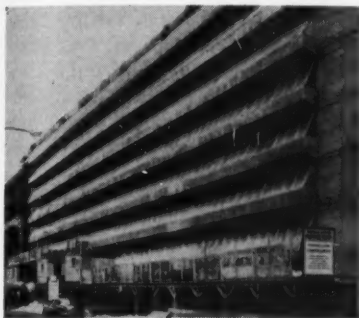
Two new high-frequency one-man vibrators with sufficient power for fast penetration and compaction are available from Gardner-Denver. The heavy-duty model works best in concrete below 5 inches slump. It is designed for large-sized walls and pillars, heavy floors, foundation and roof construction work. The lighter model is adapted for working medium-sized walls and pillars and for precasting. The firm claims that maintenance costs and down time are almost nonexistent and that compaction rate is limited only by the efficiency of the operator. Write **Gardner-Denver Company, Quincy, Ill.**

### Anchoring Compound

A new chemical element has been added to Evr-Tite to improve this fast-setting, pourable cement for speedy bolt anchoring, according to the manufacturer. Supplied as a powder, Evr-Tite mixes readily with water to form a semi-fluid compound. Applied around an anchor bolt, it attaches itself to the bolt surface, fills all sections of the hole and produces a void-free, monolithic anchor. Ten minute setting of the cement is reported. Bolts can be drawn tight and light machinery put in operation within half an hour. Heavy vibrating equipment can be used in under one hour. The material is also recommended for fastening and setting of pipe flanges, partitions, parking stanchions and meters, hand rails and stadium and theater seats, as well as for repairing shallow holes in concrete floors. Write **The Monroe Company, Inc., 10703 Quebec Avenue, Cleveland 6, Ohio.**



## equipment tools

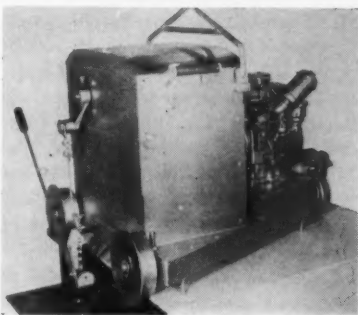


### Horizontal Shoring

Spanall, an all-metal horizontal shoring has been used throughout the Mortimer-Division garage, Rochester, New York, in erecting the reinforced formwork for the ramps and all floor areas. A. Friederich & Sons Company, contractor, reports appreciable time and cost savings from the use of Spanall on this project. **Spanall of the Americas, Inc., 787 United Nations Plaza, New York 17, New York.**

### Pin Puller

This 565-pound, automatic pin pulling machine is operated by one man and will pull up to 1500 pins an hour without damage to forms or concrete in road construction. Pins have longer life because they come out without bending. Riding on rubber tires, the machine is easily moved, operating on either side forward or backward. **The Cleveland Formgrader Company, Mills Road, Avon, Ohio.**



## Dodson's Digest



### A capsule summary

Bill Kaiser, who's doing the concrete work on a new skyscraper, invited me down to watch the laying of the cornerstone. A time capsule was imbedded in it, to be sealed at the end of the ceremony . . . and opened in 100 years.

"This is kind of a thrill for me, Dod," he beamed, as the festivities began. "My biggest job — and the first one calling for the formality of a cornerstone!"

"You've a right to be proud, Bill," I said, "and Calcium Chloride has played no small part in your success."

"Sure," he retorted, "though you didn't really have to sell me on it for winter concreting. But using it in the summer just doesn't . . ."

"I know you didn't ask me here to give you a pitch on Calcium Chloride, Bill. But had you used it on this job, they probably would've laid the cornerstone a week ago. Even during warm weather, Calcium Chloride cuts initial and final set time in half. At 70°, it develops 145% greater strength in one day! You get your men in *and out* faster, your investment is returned that much sooner. You can't lose, no mat—"

"Hey, Dod!" he interrupted. "They're about to seal the capsule. Quick, give me one of your cards!"

Puzzled, I handed him a card and he ran over to the cornerstone.

"Well, that's that," he smiled, walking back, after a few minutes.

"What's what?" I asked.

"Without going into a lot of detail," he replied, "just remember that in 2058, when they open the capsule, they'll hear the taped voice of L. D. Dodson, specialist in Calcium Chloride! Matter of fact, I used it on this job, but 'egged' you into your speech for the recording!"

— L. D. DODSON

**P.S.** — For timely facts on how Wyandotte Calcium Chloride can help you, consult our folder, "How To Make Better Concrete Products and Ready-Mix." For your free copy, just drop me a line. **Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.**

**Wyandotte**  
CHEMICALS



MICHIGAN ALKALI DIVISION

HEADQUARTERS FOR CALCIUM CHLORIDE

Circle #431 on mailing card

# CHALLENGE

## "INSTANT TROWEL"

### combination floating and finishing machine

# So fast and powerful yet handles with ease

Our claim is that the Challenge Trowel is the most sturdy concrete finishing machine available. If you have not yet seen or tried the Challenge, you owe it to yourself to do so. See and compare the heavy duty 1½" main shaft, the extra sturdy spider plate and the safe, stationary guard ring. Try it and you will agree — that where a Challenge has passed — there's a finish that will last!

Fast, positive blade adjustment

Strong dual handles

36" and 48" models

Fingertip controls

**COOK BROS.**

**Cook Bros. Equipment Co.**

Exclusive world wide distributors for The Challenge Instant Trowel

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MANUFACTURING PLANTS

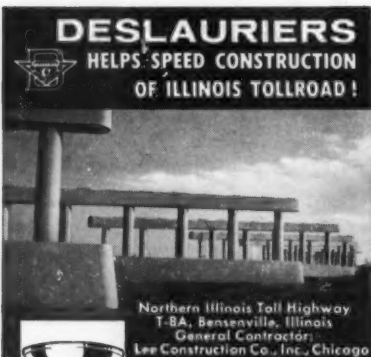
Los Angeles, California • Avon, Ohio

Dealers note: franchise still available in some areas

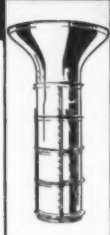
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Circle #408 on mailing card

**DESLAURIERS**  
HELPS SPEED CONSTRUCTION  
OF ILLINOIS TOLLROAD!



Northern Illinois Toll Highway  
T-BA, Bensenville, Illinois  
General Contractor:  
Lee Construction Co., Inc., Chicago



**... ROUND METAL  
FORMS CUT COSTS  
ON OVER 1500  
CONCRETE COLUMNS**

The Northern Illinois Toll Highway is one more project where Deslauriers Round Column Forms are speeding concrete column erection, obtaining uniformly smooth, straight columns—with substantial savings in materials and manpower. Diameters 12"-86", any height, two attractive Capitals. For lease only, or lease-and-erection. Free quotations.

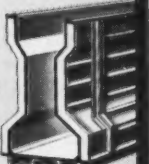
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**ECONOMY** STEEL  
FORMS  
for  
precast  
**PRESTRESSED**  
concrete



Above: Skeleton drawing of Economy Steel Forms used in producing standard AASHO precast-prestressed highway beams.

With Economy Steel Forms, you can get into the profitable precast prestressed concrete business with a moderate investment. Send coupon below for catalog.

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City \_\_\_\_\_ State \_\_\_\_\_

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## literature

**Form oil additive.** A bulletin on Alox 436 gives specific information on its use as an additive for compounding concrete form oils which can be applied by brush or spray. The material prevents concrete from sticking to metal molds and the film left on the forms will prevent corrosion during outdoor storage. Alox Corporation, Niagara Falls, New York.

**Design manual.** This 44-page manual on the use of welded wire fabric in reinforced concrete building construction has been revised to correspond with the latest edition of American Concrete Institute's "Building Code Requirements for Reinforced Concrete" and the American Society for Testing Materials' "Specifications for Welded Steel Wire Fabric for Concrete Reinforcement." Diagrams, tables and design data make the manual helpful where steel fabric is to be used in short-span construction, cinder concrete floors and roofs, tilt-up wall construction, cement gun work and other current practices. Wire Reinforcement Institute, Inc., National Press Building, Washington 4, D. C.

**Abrasive aggregate.** Alundum aggregate used in concrete floor mixes provides permanent non-slip protection, even when surface is wet or oily, and assures good resistance to heavy wear and dusting. Catalogue 1935 describes the product in detail, gives pictures of installations and full specifications for use. Norton Company, Worcester 6, Massachusetts.

**Liquid ballast for tires.** An interesting use of calcium chloride solution is explained in a booklet. The tires on earth moving equipment and loaders may be weighted with calcium chloride solution instead of merely filling with air. The additional weight provides better traction, as well as providing other advantages. A table gives required amounts by tire size and type of equipment. General directions for using calcium chloride for this purpose are also provided. Columbia-Southern Chemical Corporation, One Gateway Center, Pittsburgh 22, Pennsylvania.

**FREE copies of these items may be obtained by mailing the reader cards facing page 18.**

**Bonding agent.** A report on tests made by the Pittsburgh Testing Laboratory, Miami, Florida on Weld-Crete is presented in a folder. The test compared the strength of a laminated structure made by bonding a 2-inch concrete topping to a concrete base slab with Weld-Crete with that of a single pour of the same total depth and showed the laminated beam to be stronger. Larsen Products Corporation, Bethesda, Maryland.

**Heavy duty coating.** Bulletin LL-4874 contains suggestions for concrete floor and pavement sealing, damp-proofing, water-proofing with membrane, metal roof sealing and anti-corrosive coating of metal with Jennite-16 heavy duty coating. Specifications for each type of work, data on Jennite's composition and chemical properties and application methods are included. Maintenance, Inc., Wooster, Ohio.

**Demolition tools.** A 24-page bulletin, Form 4190, describes 16 digging and demolition tools and 64 accessories. A full-page guide for reforging, sharpening and hardening these tools can be removed from the bulletin and tacked up as a wall chart for quick reference in the reconditioning shop. Ingersoll-Rand, 11 Broadway, New York 4, New York.

**Power carts.** Several models of this manufacturer's power carts are pictured in use, and specifications are given. They feature fast acceleration and instant reversing at any speed, U-turns within a radius of 4 feet, controlled dumping, low operating-maintenance cost and other advantages, according to the manufacturer. Bulletin 83-A, Gar-Bro Manufacturing Company, 2415 East Washington Boulevard, Los Angeles 21, California.

**Internal concrete vibrators.** Several weights and head sizes for electric, pneumatic and gasoline flexible shaft driven vibrators are listed and pictured in folder VD 113E1. Also included in the folder are full specifications and descriptions of several models of pneumatic external vibrators and industrial vibrators. Viber Company, 726 South Flower Street, Burbank, Calif.

## literature

**Bonding agent.** Sta-Crete Epoxy Resin Bond restores spalled and cracked concrete, renews floors, patches, bonds concrete to steel, bonds concrete curb to old concrete and may be used for grouting according to a folder available from Sta-Crete, Inc., 115 New Montgomery Street, San Francisco 5, California.

**Power float or floor grinder attachments.** A grinding ring and four types of brushes for various purposes in floor finishing and maintenance are described in bulletin K-104. Specifications for the use of each item are included. Kelley Machine Division, Wiesner-Rapp Company, Inc., 285 Hinman Avenue, Buffalo 23, New York.

**Column moulds.** The advantages of round column design are explained in a brochure. Photographs show various types of projects where they have been used. DesLauriers steel column molds are butt jointed at vertical and horizontal seams, eliminating lap joints. They are light and flexible, but strong enough to insure smoothness and hard finish of the columns. Galvanized to prevent rust spots on concrete, the forms are shipped oiled and ready for use. They may be leased, and the firm also offers lease-and-erection service. Specifications are included in the brochure. DesLauriers Column Mould Company, Inc., 5036 West Lake Street, Chicago 44, Ill.

**Paving newsletter.** "Paving Progress," a monthly newsletter, provides contractors with information on developments in concrete pavement technology, construction methods and equipment, and design features. As the nation's highway program progresses, many new developments will be made to improve efficiency, cut costs and assure construction of quality concrete pavements. The newsletter will reflect activities of immediate interest to paving contractors, drawing on information supplied by the nationwide field organization of the Portland Cement Association. Portland Cement Association, 33 West Grand Avenue, Chicago 10, Ill.

FREE copies of these items may be obtained by mailing the reader cards facing page 18.

**Steel forms.** A booklet contains photographs of many jobs being completed with Atlas Steel Forms. The manufacturer can provide steel forms for wall, floor, column, pan, tunnel, caisson, bridge, road, sewer and any other type of job. Their engineering department will help the contractor with labor costs, layouts and technical data, according to the booklet. They claim that new designs, standardization and re-use of units and materials, lower moving, erection and stripping costs, utilization of conditions at the site and other processes save in labor, time, materials and money. Concrete Forms Corporation, Irvington-on-the-Hudson, New York.

**Film on lift slab construction.** A thirty minute color sound motion picture on the lift slab method of construction is available to any interested person. The film is a pictorial record of the construction of a building from the time footings are placed to the completion of the building, emphasizing the operation of lift slab equipment and its function in the construction. Technical literature is also available upon request. United States Lift Slab Corporation, 4117 Broadway, Kansas City 11, Missouri.

**Concrete hardener.** A brochure outlines the features of Lapidolith, a chemical preparation for hardening and dust-proofing concrete floors. Photographs of installations, specifications, application data and a chart comparing Lapidolith's hardening and penetrating action with conventional concrete hardeners are included. Use of the material on vertical concrete surfaces is explained. Building Products Division, L. Sonnenborn Sons, Inc., 404 Fourth Avenue, New York City.

**Prestressing.** A 14-page brochure covers history and development of prestressed concrete and explains the Prescon System of post-tensioning. Application examples in different types of structures, detailed technical data, estimated labor for placing, guide specifications and detail drawings are included. The Prescon Corporation, P. O. Box 4186, Corpus Christi, Texas.

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**PERMANENTLY**  
**BOND** new  
**CONCRETE** to old  
**CONCRETE**

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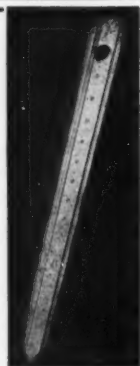


**Typical Weld-Crete Application:** One of several Southern California High Schools where Weld-Crete was sprayed on new, smooth fill-up wall to provide bond for sprayed on stucco application. Arch., H. L. Gogerty; Gen'l. Contr., J. C. Soesflug Contr. Co.; Plstg. Contr., A. D. Hoppe Co. Applicator: F. K. Pullen Co.

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